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FINAL REPORT

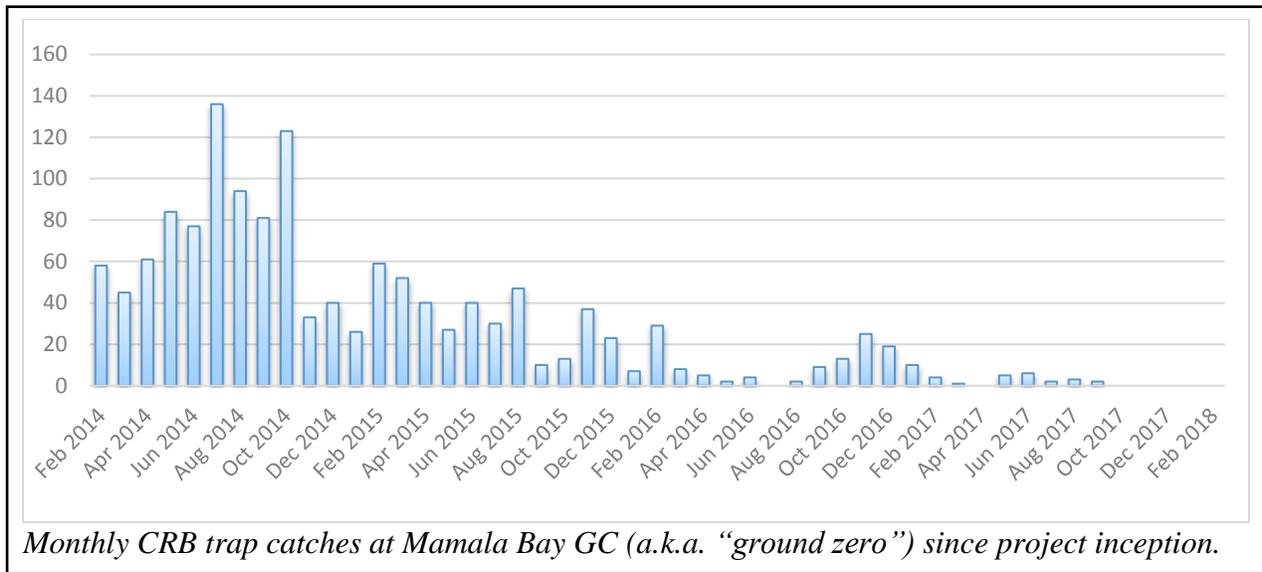
Project Title: Response to Coconut Rhinoceros Beetle and other Palm Pests in Hawaii
Project Period: April 1, 2017 to March 31, 2018
Sponsor: Hawaii Invasive Species Council
Funding Amount: \$258,200
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Executive Summary

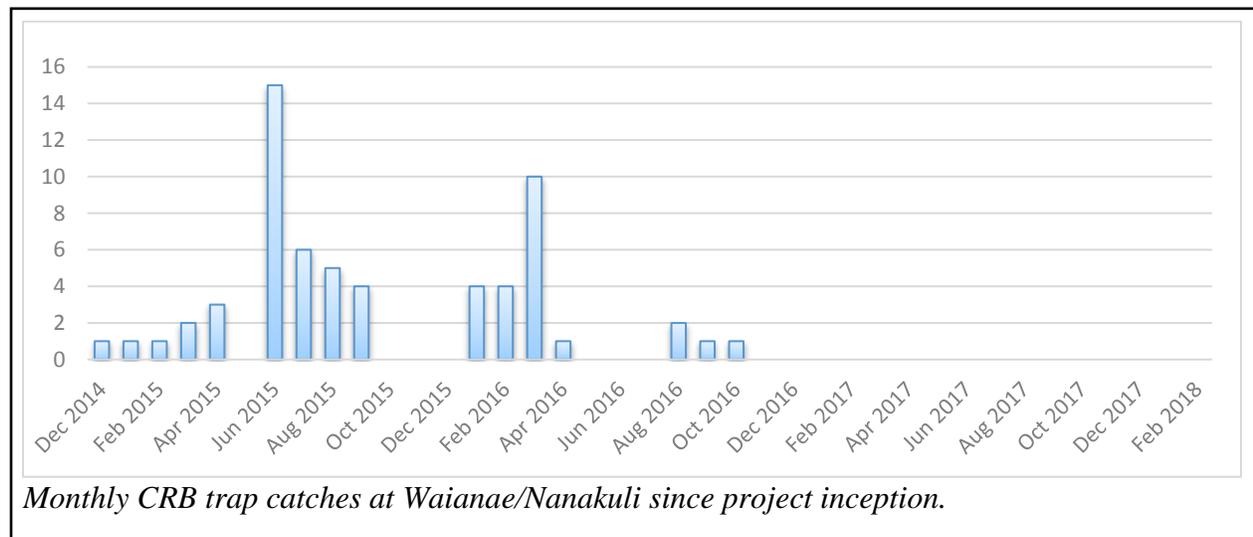
The coconut rhinoceros beetle (CRB; *Oryctes rhinoceros*) was detected in December 2013 on Oahu at Joint Base Pearl Harbor-Hickam (JBPHH). A response program with the goal of eradicating CRB from Oahu was jointly created by the United States Department of Agriculture (USDA) and the Hawaii Department of Agriculture (HDOA). A wide-range of both federal and state agencies also provide assistance to the response program. Federal funding from USDA for the CRB response had decreased by approximately \$1 million, threatening the progress that has been made since the inception of the project. This HISC-funded project addressed this shortfall, primarily by supporting field staff for operations to detect, control, contain and eradicate CRB (and other palm pests which can be trapped concomitantly) and was fully integrated into a concurrent project funded by USDA and JBPHH. The project deliverables captured in this final report describe the integrated activities conducted by the response program during the reporting period.

Overall Project Progress

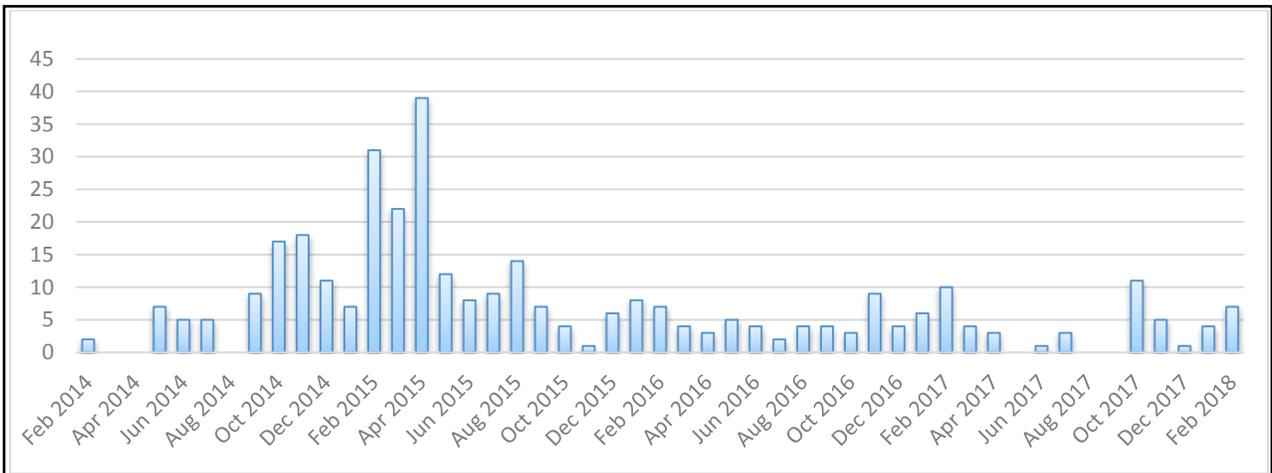
At the onset of the CRB Response in early 2014, Mamala Bay Golf Course was considered the primary infestation point and focus of the response (a.k.a. “ground zero”). This population has been reduced to marginal/undetectable levels due to the efforts of the multi-agency response effort. A total of five beetles have been detected at Mamala Bay GC during the current reporting period, and none since September 2017:



Delimiting surveys revealed a CRB population on the western coast of Oahu (Waianae/Nanakuli) in late 2014. Although apparently smaller in size than at Mamala Bay GC, this population has followed a trajectory similar to that of Mamala Bay, with no CRB detections since October 2016:

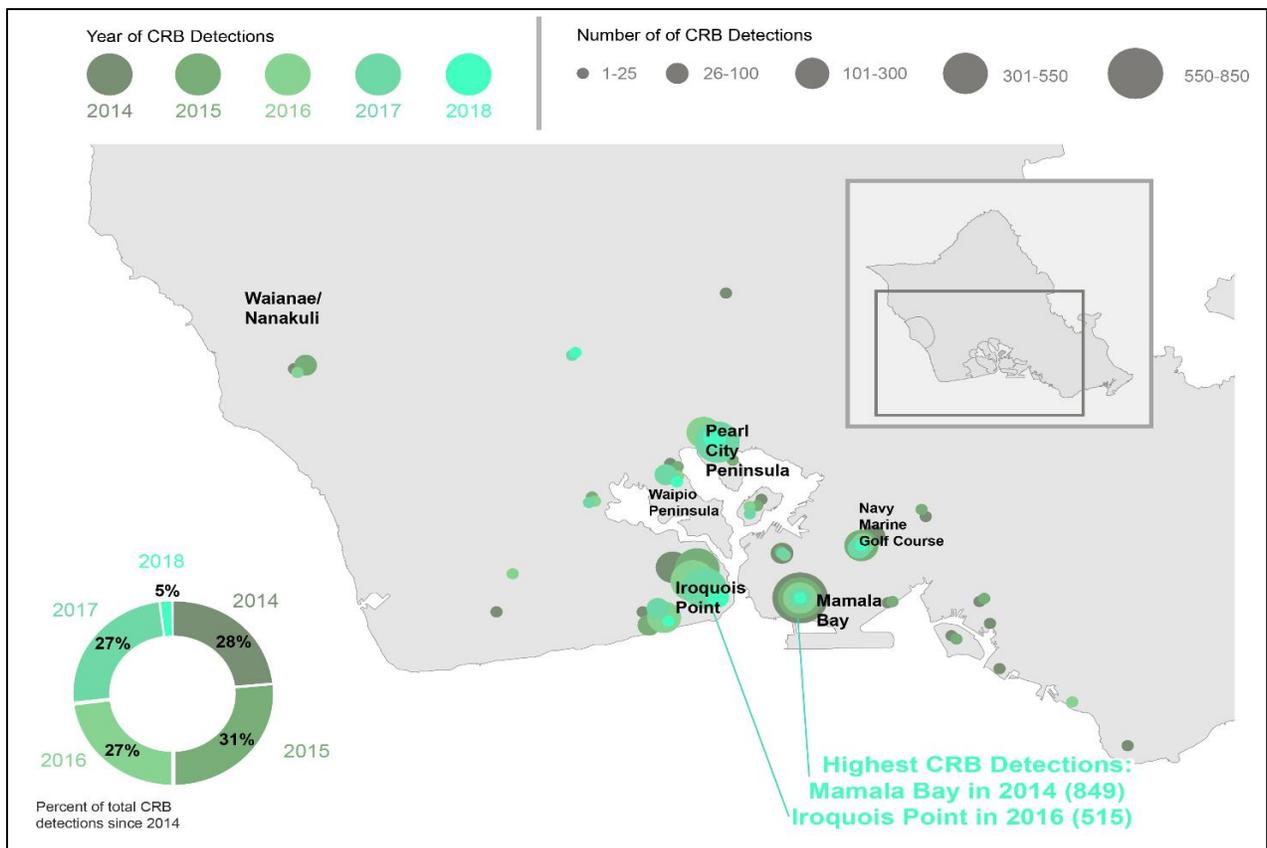


Delimiting surveys also revealed a CRB population at Navy Marine Golf Course in early 2014, which is located just northeast of Mamala Bay GC. Although a small CRB population continues to persist at Navy Marine GC, its numbers appear to be declining due to response efforts:



Monthly CRB trap catches at Navy Marine GC since project inception.

With our CRB Response now focused on Pearl City Peninsula and Iroquois Point, we are aiming for similar downward trends in the CRB population at these locations as well:



Specific Metrics for the Project Period

- A total of 32 CRB response staff were employed by the response program during the project period, and were partially supported by HISC funding. These staff, in conjunction with JBPHH staff and contractors, were responsible for the following project metrics during the project reporting period.
- A combination of barrel and panel traps are placed and monitored across Oahu. These traps use combinations of pheromone lures, UV lights, and compost as attractants. There are 3102 CRB traps on Oahu:
 - 2,890 Panel Traps
 - 117 Barrel Traps
 - 5 Controlled Breeding Sites
- Traps are routinely evaluated by our quality control personnel for optimal placement, and attractant effectiveness (pheromone lure replacement). UV lights and their solar panels began to be phased out in February 2017, due to their labor-intensive & cost-prohibitive nature. Previous to February 2017, UV light replacements were limited to traps within priority areas.
 - 524 quality control trap inspections
 - 3,806 pheromone lure replacements
 - 94 trap replacements of broken or missing traps
- The desired trap density inside the known CRB infested area (defined as two-mile buffer radius around all past-year CRB finds) remains at approximately 64 traps/square mile.
 - The CRB Buffer area currently stands at 81 square miles as of February 28, 2018, requiring approximately 5,184 traps to reach the desired trap density with that area. We currently do not have the funds or staff required to service this number of CRB traps on a weekly basis. In addition, it is not always possible to place 64 traps/square mile due to unexploded ordinances, other military restrictions, access restrictions, dense vegetation, airports, large buildings, waste-treatment plants, etc.
 - Trap density can change drastically from one area to another based on immediate trap detections.
- Outside of the infested area, traps remain at a density of 4 traps/square mile or less with an emphasis placed on high-risk locations.
- Monitoring of traps within the infested area occurs as frequently as once per week, whereas traps outside of the infested area are monitored on a three-to-four week basis.
- All green-waste areas within the infested area are surveyed every two months for presence of CRB life stages. A molecular diagnostic assay will be used to distinguish CRB eggs and early instars from other morphologically similar beetles that might also reside in these green-waste areas.

- 402 mulch sites surveyed for CRB (number includes revisits)
- 1,442,404 cubic feet of green waste surveyed
- 64 square miles swept for potential breeding sites
- 261 Larvae found in mulch
- 10 adult CRB found in mulch
- Where trap detections occur, survey teams examine surrounding trees for visual signs of damage, sanitation issues, and other concerns, and mulch and green waste piles are identified for destruction. All trees with confirmed CRB damage are tagged with a unique ID, and we conduct reoccurring surveys to monitor the damage.
 - 122 trees tagged with CRB damage
- Whenever third parties fell CRB-damaged palm trees, we witness the removal and inspect for presence of CRB.
 - 6 palms felled that showed signs of CRB damage
 - 0 adult CRB recovered
- Palm tree stumps are ground and covered with at least six inches of soil.
 - 2 stumps ground
- Identified larval breeding sites are devitalized by in-vessel composting or sent for incineration.
 - 32,088 tonnes burned in air curtain burners on JBPHH
- Safeguarding methods for transporting infested materials include such methods as chipping to destroy adults and late instars, and tightly covering said materials.
- All CRB found in the field will be collected and housed at the UH CRB rearing laboratory which became operational in 2016.
 - 375 live beetles collected & sent to UH CRB colony
- Associated with the survey is an Outreach Program to work with residents, landowners, stakeholders, and the media. This Outreach Program disseminates pertinent information verbally during seminars and workshops, electronically via a website and social media, and in print through brochures, and local newspapers.
 - 8 community events with a reach of 1,276 attendees
 - 10 stakeholder groups with a reach of 227 employees
 - 5 landscaping companies with a reach of 650 employees
 - 10 schools with a reach of 812 students
 - 261 Public reports were addressed by field crews
 - Field crew interacted with 555 members of the public and 103 stakeholders or employees
 - Ongoing partner outreach campaigns with Oahu Invasive Species Committee, Malama Learning Center, Hawaii Department of Agriculture, and the Department of Navy in Hawaii.
 - Television – 3 rotating video segments for local television show "Outside Hawaii".

- Print – Article in "Maui News" highlighting training received by Invasive Species Committees.
- Continued coordination with Hawaii Department of Agriculture, University of Hawaii, Oahu Invasive Species Committee, and Malama Learning Center
- Social Media – presence on major platforms with web videos.